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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

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Bruce Lehman

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Sandra L Morton

Attest

US005798746A

United States Patent [19]

Koyama

[11] Patent Number: 5,798,746

[45] Date of Patent: Aug. 25, 1998

[54] **LIQUID CRYSTAL DISPLAY DEVICE**

[75] Inventor: **Jun Koyama**, Kanagawa, Japan

[73] Assignee: **Semiconductor Energy Laboratory Co., Ltd.**, Kanagawa, Japan

[21] Appl. No.: **362,881**

[22] Filed: **Dec. 23, 1994**

[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[6] **G09G 3/36**; G02F 1/13

[52] **U.S. Cl.** **345/98**; 345/92; 345/89

[58] **Field of Search** 345/89, 100, 92, 345/98, 90; 359/79, 56, 87

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[57] **ABSTRACT**

In an active matrix type liquid crystal display device, a time gradation display manner for performing time gradation display is used. A digital gradation (voltage) signal on a signal line is supplied to the digital memory circuit arranged in vicinity of each pixel electrode and stored therein for a desired period of time. This storage state is held until next scanning is started. A high voltage or a low voltage supplied as a power source voltage of the digital memory circuit is applied to a pixel electrode while the digital memory circuit is in a storage state, so that a desired voltage is stably applied to the pixel electrode.

29 Claims, 8 Drawing Sheets